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(54) **Apparatus for methods for using packs of flexible tubing in packaging.**

(57) A pack comprising a core (1) and pleated tubing is used to provide a series of packages (35) each containing a disposable object such as a baby's nappy along the tubing as it passes over the top edges of the core (1) and then down through the core (1). The core is turned by means of a lid (31) about a cylinder (23) to twist the flexible material at locations (30) between the adjacent packs to seal the packs at their ends thereby providing hygienic disposal of the waste. A safely located rotatable cutter in the lid (31) is provided for severing the flexible tubing above the top twist (30).

## Description

### APPARATUS AND METHODS FOR USING PACKS OF FLEXIBLE TUBING IN PACKAGING

This invention relates to apparatus and methods for using packs of flexible tubing in packaging and in particular to packaging a series of objects respectively in individual packages along a length of such flexible tubing.

The invention is particularly applicable to the disposal of waste material although it is by no means exclusively applicable to that function.

A main object of the invention is to provide for the ready disposal of babies' disposable nappies. There is an extremely large market for these disposable nappies and mothers enjoy the convenience of using them but they all face the inevitable inconvenience of disposing of them afterwards and they have been left to find their own solutions to the problems of hygienic and smell-free disposal. There is obviously a need to improve the hygiene, convenience and economy of these objects and to improve the suppression of, or if possible, completely eliminate the smell.

European patent application No. 0006660 describes a piece of kitchen furniture whereby kitchen refuse can be disposed in packages enclosed by flexible tubing derived from a tubular pack of tubing surrounding a tubular guide. The tubing passes from the pack over the top of and then down the guide to a position beneath the guide where it has been closed by fusion to provide a receptacle within the guide means. When this receptacle is full of refuse, a lever is manually operated to actuate an electro-mechanical apparatus including clamping and fusion devices that travel round closed tracks to perform the four-fold task of drawing the receptacle down below the tubular guide, fusing the tubing walls together to seal the top of the receptacle, sealing the tubing walls together to provide the closed base of the next receptacle and dividing the tubing by heat at a location between these two fusion locations to separate the filled package.

Obviously it is essential to avoid the presence of electricity anywhere where there may be babies present and where there can be moisture. Clearly also complicated mechanical devices are to be avoided where reliability and economy are essential.

A principal object of the invention therefore, is to provide a safe and comparatively simple portable apparatus that is quick and easy to operate, that stores soiled nappies in flexible tubing from a pack thereof very hygienically for more than a day if required, and then allows them to be disposed of in a closed container. The apparatus is then reused until it has fully used its pack of simple and cheap packaging material when it can be recharged with another pack.

According to the present invention, apparatus for packaging a series of objects respectively in individual packages distributed along a length of flexible, substantially non-resilient tubing providing the walls of the packages comprises tubular guide

means arranged to receive a substantially vertical pack of said flexible tubing when formed into a gathered tube and to enable one end of the tubing in the gathered pack to be drawn away from the top of the gathered pack and passed over the top of the tubular guide means when surrounded by the gathered pack and then coaxially downwards through tubular guide means so that the outer surface of the flexible material in the pack becomes the cylindrical inner surface of the flexible material passing through the tubular guide means, the top end of the flexible tubing being initially open until sealed to form the base of a first package having the flexible tubing as its side wall, the apparatus being arranged for the base to be thrust downwards as by an object to be packaged, while further flexible tubing is drawn from the pack over the top of the tubular guide means into the tubular guide means providing space for an object to be packaged when located in or below the tubular guide means, and means above the tubular guide means for manually twisting the flexible tubing above an object when so located to close and thereby complete a package comprising that object and so provide the base for a further package for a further object to be thrust into the tubular guide means.

According to another aspect of the invention, a method of packaging a series of objects respectively in individual packages distributed along a length of flexible, substantially non-resilient tubing providing the walls of the packages comprises arranging a substantially vertical pack of said flexible tubing, when formed into a gathered cylinder, around tubular guide means, drawing one end of the tubing in the gathered pack from the top of the pack, closing said end to provide the base of a first package, having the flexible tubing as its side wall, thrusting an object to be packaged against the said base to push the base downwards thereby drawing further flexible tubing from the pack over the top of the tubular guide means until the object has been located in or below the tubular guide means, and manually operating twisting means to twist the flexible tubing above the object when so located to close and thereby complete a package comprising the object and so provide the base for a further package for a further object to be thrust into the tubular guide means.

The invention may be employed for various forms of waste, besides babies' disposable napkins. For example, the invention may be used in a hospital or for a dustbin. In this specification the items deposited in the packages will be referred to, except where otherwise indicated, as objects, whether they are single objects or discrete collections of items or even liquids.

In order that the invention may be clearly understood and readily carried into effect apparatus and methods in accordance therewith will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation, mostly in section, of apparatus for packaging a series of objects respectively in individual packages distributed along a length of flexible tubing;

Figure 2 is a plan of the apparatus of Figure 1;

Figure 3 is a side elevation, partly in section, showing portions of the apparatus of Figures 1 and 2 when separated from one another;

Figures 4 and 5 are diagrams showing alternative ways in which the apparatus of Figures 1 to 3 can be used; and

Figure 6 is a plan, shown from beneath, of a detail of the apparatus of Figures 1 to 5.

Referring to Figures 1 to 5, a plastics container 21 is formed with an internal flange 22 from which a cylinder 23 extends upwards. A pack consisting of a tubular core 1 inside a profusely circumferentially pleated length of flexible tubing 2 is located in the container 21 with the core 1 resting on the flange 22 and rotatable on the cylinder 23. To begin using the pack to form a series of packages of objects, which in this particular example will be considered to be a baby's disposable nappies, the top of the flexible tubing 2 is pulled upwards and tied into a knot 24 (Figure 3). This closed end can then form the bottom of a package to be formed along the length of part of the tubing. This is effected by pushing the closed end downwards inside the core 1 and cylinder 23 by the object to be packaged. As this is being done the flexible tubing 2 from the pleated length slides over the top edge 25 (Figures 1 and 3) of the core 1 which is made sufficiently smooth to prevent the flexible tubing from being damaged. The core 1 may be approximately four inches (10.16 cm) diameter but, of course, the diameter of the flexible tubing 2 is substantially more than this.

When the object has been thrust well down into the concentric core 1 and cylinder 23, the package is closed by twisting the flexible tubing 2 above the object as at 30 (Figure 1). This is done by turning the core 1 with remaining pleated tubing thereon about the core axis. A lid 31 is formed for this purpose in that it has a depending annular flange 50 formed with an outer surface that is a taper fit in a frusto-conical inner surface 51 at the top of the core 1. The package is prevented from turning about the axis of the core during this manual twisting action by springs 52 fixed to the container 21 and projecting radially inwards to engage the package. These springs are equidistantly spaced round the container 21. Shallow, grooves dividing upwardly extending ridges are formed on the frusto-conical inner surface 51 to stop slippage of the flexible tubing during the twisting operation.

By the aforesaid means, a series of connected closed packages 35 are formed and this can be continued until the pleated tubing 2 is exhausted. In the arrangement of Figure 1 the packages collect in a bin portion 36 of the container closed at the bottom by a hinged base 53 normally held closed by a manually operable catch 54. When it is desired to remove the packages from the bin portion 36 for transport to a waste disposal facility, the uppermost package is severed by means described below above its upper twisted closure 30 and the hinged

base 53 opened for the removal of the packages through the end of the bin portion. Even if the twisted seals between the packages become loosened, the lid and the newly formed topmost twisted seal will prevent the escape of odours, vapours and gases to the ambient atmosphere. However, it has been found that when the tubing 2 is made of high density polyethylene the twisted joints remain remarkably tight.

The aforesaid severing means is incorporated in the lid 31 which is a bipartite unit comprising an outer ring 55 formed with the flange 50 that locks into the top of the core 1 and a disc 56 (Figure 6 which is an underneath plan) which is freely rotatable in the ring 55. The disc 56 comprises a circular transparent sheet 57, through which the user can see the twisted flexible tubing, set in an angle section ring having a horizontal flange 58 and a vertical flange 59 (Figure 1) located between narrow flanges inside the relatively stationary flange 50. In the angle of the ring 58, 59 three finger pieces 60 are fixed 120° apart above the transparent sheet 57. A cutter unit 61 is fixed beneath the flange 58. This device has an upper arcuate part 62 and a lower tapered shoe 63 with a gap between them along the major portion of their length. Close to the closed termination of this gap a metal cutter blade 64 is fixed as close as possible to the relatively stationary flange 50 so that the blade is shrouded against doing any damage to a person's fingers when the lid 31 is removed. The predominant material for the lid may be plastics material or metal.

To operate the cutter unit 61, the disc 56 is turned by means of the finger pieces 60 through a full revolution. In this movement the tapered shoe 63 pierces through the radially pleated taut portion 65 of the flexible tubing that flares outwards from the topmost twist 30 to the core 1. Further rotation of the disc 56 causes the cutter blade 64 to cut round the tubing material, cleanly separating the uppermost package from the flexible tubing remaining on the core 1.

A see-through cover 66 made from plastics moulded material is screwed onto the top of the container 21 by means of coarse threads 67. This has a handle 68 enabling the apparatus to be carried about, and hinged lid 69 which is held closed by a latch 70 arranged to be difficult for a toddler to operate and open the cover to start playing with the lid 31.

When the flexible tubing has all been used, the lid 31 is removed, the core 1 withdrawn and a refill pack as shown in Figure 3 inserted. The core 1 is a rigid plastics moulding with a flange 71 at the bottom that supports the pleated length of flexible tubing 2 that is 75 feet (22.875 m) long, enough to accommodate approximately 108 disposable nappies in separate packages. An angle-section plastics ring 72 is supported above the pleated tubing. This provides sufficient clearance with the core 1 to enable the tubing to be drawn upwards from the pack. A flexible, transparent, plastics sleeve 73 surrounds the pack and is secured to an upturned flange 74 on the flange 71 and to the ring 72 by sticky tape (not shown).

Figure 4 shows how the apparatus can be used to produce a single large package substantially filling the bin portion 36 of the container 21. The tied end 24 of the flexible tubing is pushed down to the bottom of the bin portion 36 as the tubing is filled and when the package is full enough to be gripped by the springs 52 it is sealed by twisting the tubing at 30 by means of the lid 31. This package can hold approximately 310 disposable nappies using the pack described above.

Figure 5 shows a method which is intermediate between those described above with reference to Figures 1 and 4 respectively, packages of different sizes being produced according to the positions of the points at which it is considered desirable to twist the top of a topmost package to prevent the escape of odours, vapours or gas.

It will be understood that various modifications may be made to the example particularly described above without departing from the scope of the following claims. For example, a sleeve can be rotatably mounted on the cylinder 23 for the pack to be fitted tightly thereon, the sleeve being extended upwards to present the frusto-conical inner surface 51 for turning the pack about its axis to twist the flexible tubing. For example, also the bin portion 36 may be made detachable from the portion of the container containing the pack and associated parts. Yet again, a cutter for severing the topmost package from the remainder of the flexible tubing can be provided beneath the pack location. The various objects described above as cylinder, core, casing and sleeve do not have to be solid tubes but can be perforate or openwork elements.

## Claims

1. Apparatus for packaging a series of objects respectively in individual packages distributed along a length of flexible, substantially non-resilient tubing (2) providing the walls of the packages, the apparatus comprising tubular guide means (1, 23) arranged to receive a substantially vertical pack of said flexible tubing when formed into a gathered tube and to enable one end of the tubing in the gathered pack to be drawn away from the top of the gathered pack and passed over the top (25) of the tubular guide means when surrounded by the gathered pack and then coaxially downwards through the tubular guide means so that the outer surface of the flexible material in the pack becomes the cylindrical inner surface of the flexible material passing through the tubular guide means, the top end of the flexible tubing being initially open until sealed to form the base of a first package having the flexible tubing as its side wall, characterised in that the apparatus is arranged for the base to be thrust downwards, as by an object to be packaged, while further flexible tubing is drawn from the pack over the top (25) of the tubular guide means into the tubular guide means (1, 23) providing space

for an object to be packaged when located in or below the tubular guide means, and that means above the tubular guide means are provided for manually twisting the flexible tubing above an object when so located to close and thereby complete a package comprising that object and so provide the base for a further package for a further object to be inserted downwards within the tubular guide means.

2. Apparatus according to Claim 1, characterised in that it is arranged to receive a gathered cylindrical pack consisting of a pleated cylinder of flexible tubing formed with circumferential pleats and mounted on a cylindrical core (1) which at least in part constitutes the tubular guide means.

3. Apparatus according to Claim 2, characterised in that it comprises a container (21) in which the pack, when in use, is mounted, the tubular guide means comprising a support (22) fixed to the container for supporting the pack within the container and having a portion (23) arranged to project upwards in the cylindrical core, the twisting means comprising at least one element (52) mounted in the container for inhibiting axial rotation of a portion of the tubing when containing the object and a cap (31) formed to be detachably secured to the top of the cylindrical core for rotating the core on the support.

4. Apparatus according to Claim 2, characterised in that it comprises a container (21) in which the pack, when in use, is mounted, the tubular guide means comprising a support (22) with a cylinder (23) located to project upwards inside the pack and carrying a sleeve rotatable thereon for fitting in the cylindrical core, the twisting means comprising at least one element (52) mounted inside the container for inhibiting axial rotation of a portion of the tubing when containing the object and a cap (31) formed to be detachably secured to the top of the sleeve for rotating the pack carried by the sleeve.

5. Apparatus according to any one of the preceding claims, characterised in that a mutually rotatable cutter (56, 64) is mounted at the top of the tubular guide means for severing the flexible tubing after it has been twisted to close a package thereby to detach that package or any series of individual packages of which it forms the top package.

6. Apparatus according to Claim 5, and Claim 3 or Claim 4, characterised in that the rotatable cutter is incorporated in the cap and is rotatable relatively thereto.

7. Apparatus according to Claim 6, characterised in that the cap comprises an outer ring (55) arranged to be detachably attached to the core and a coaxial disc (56) rotatable in the ring by means of a finger piece (60) and carrying a shrouded blade unit (63, 64) fixed beneath the disc and formed so as to pierce the flexible tubing and sever it peripherally on rotation of the disc.

8. Apparatus according to Claim 7, charac-

terised in that the disc is transparent at its centre over an area (57) sufficient to enable the user to observe the tubing beneath.

9. Apparatus according to Claim 7 or Claim 8, characterised in that the shrouded blade unit comprises a two-armed member having a top arm (62) fixed along the bottom surface of the disc and the bottom arm (63) shaped to pierce the material of the flexible tubing, the blade being fixed to present a cutting edge between the two arms.

10. Apparatus according to any one of Claims 7 to 9, characterised in that the cap ring (55) is formed with an annular flange (50) which is a taper fit in the top of the core or of a sleeve fitting the core to enable the core to be turned about its axis and the blade in the blade unit is mounted to lie adjacent this flange.

11. A method of packaging a series of objects respectively in individual packages distributed along a length of flexible, substantially non-resilient tubing providing the walls of the packages, the method comprising arranging a substantially vertical pack of said flexible tubing, when formed into a gathered cylinder, around tubular guide means, drawing one end of the tubing in the gathered pack from the top of the pack characterised by closing said end (24) to provide the base of a first package, having the flexible tubing as its side wall, thrusting an object to be packaged against the said base to push the base downwards thereby drawing further flexible tubing from the pack over the top of the tubular guide means until the object has been located in or below the tubular guide means, and manually operating twisting means to twist flexible tubing above the object when so located to close and thereby complete a package comprising the object and so provide the base for a further package for a further object to be thrust into the tubular guide means.

12. A method according to Claim 11, characterised in that said gathered cylindrical pack is arranged as a pleated cylinder of flexible tubing formed with circumferential pleats mounted on a cylindrical core (1) at least in part constituting the tubular guide means.

13. A method according to Claim 12, characterised in that the manual twisting is effected by turning the core about its axis while the package being completed is held against axial rotation.

14. A method according to any one of Claims 11 to 13, characterised in that the flexible tubing is high density polyethylene tubing.

15. A method according to any one of Claims 11 to 14, characterised in that the objects being packaged are a baby's disposable nappies.

16. A method according to any one of Claims 11 to 15, characterised in that the flexible tubing is manually twisted by means of a cap detachably mounted above the core.

17. A method according to Claim 16, characterised in that a rotatable cutter mounted in the

cap is used to sever the flexible tubing from a package located in the core by cutting the flexible tube above the twisted tubing sealing the top of the package.

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FIG. 1 .

FIG.1.

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FIG. 2.

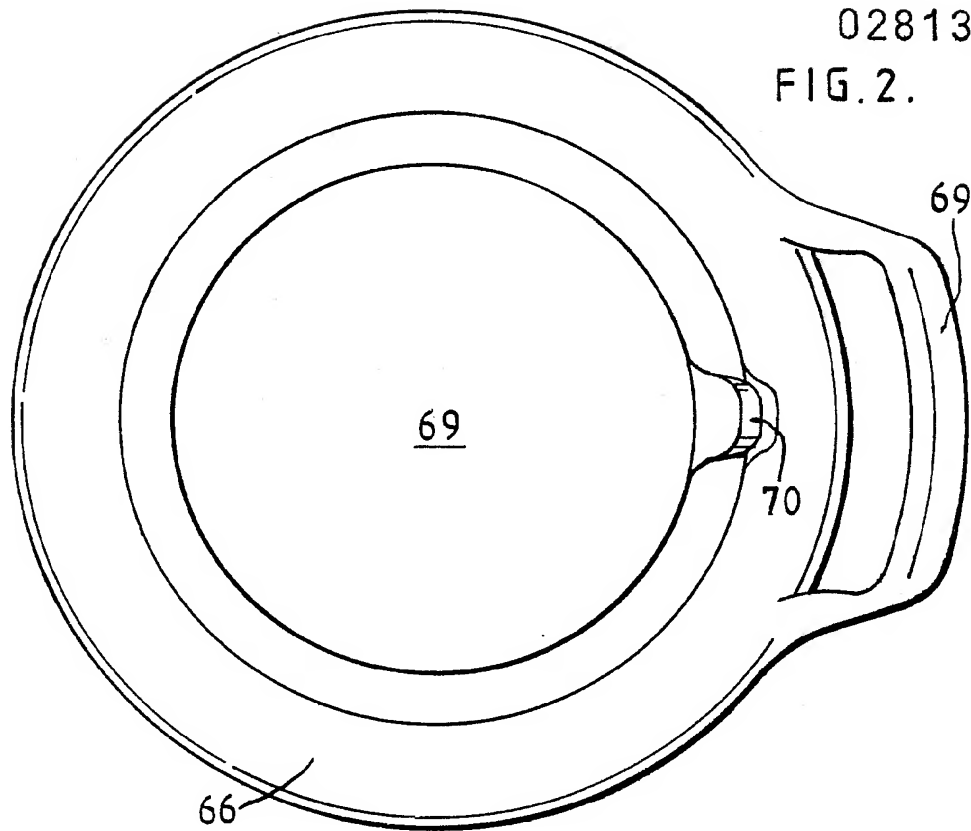


FIG. 3.

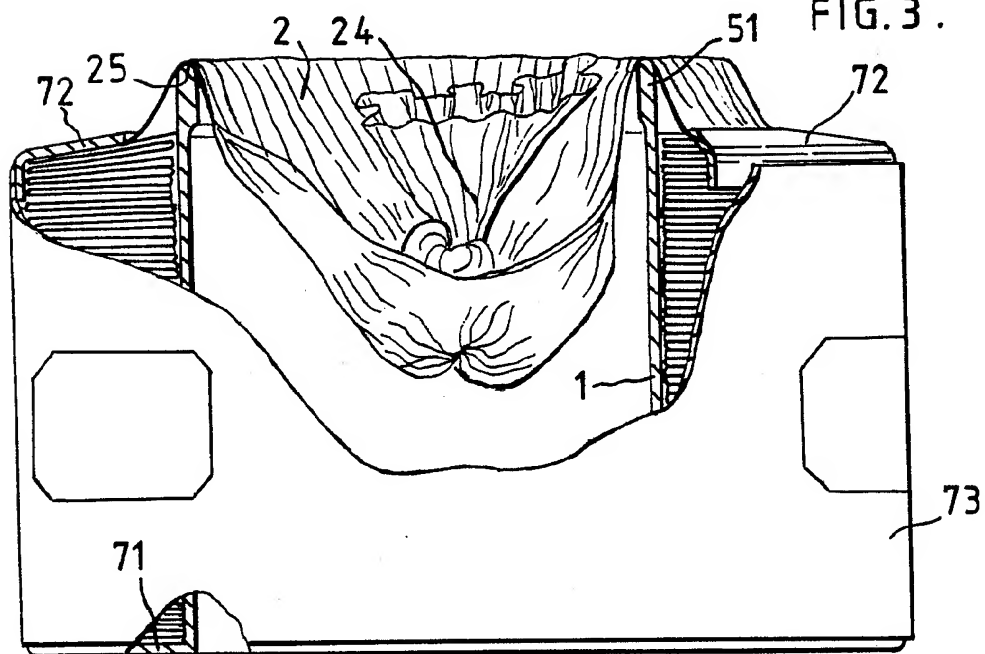
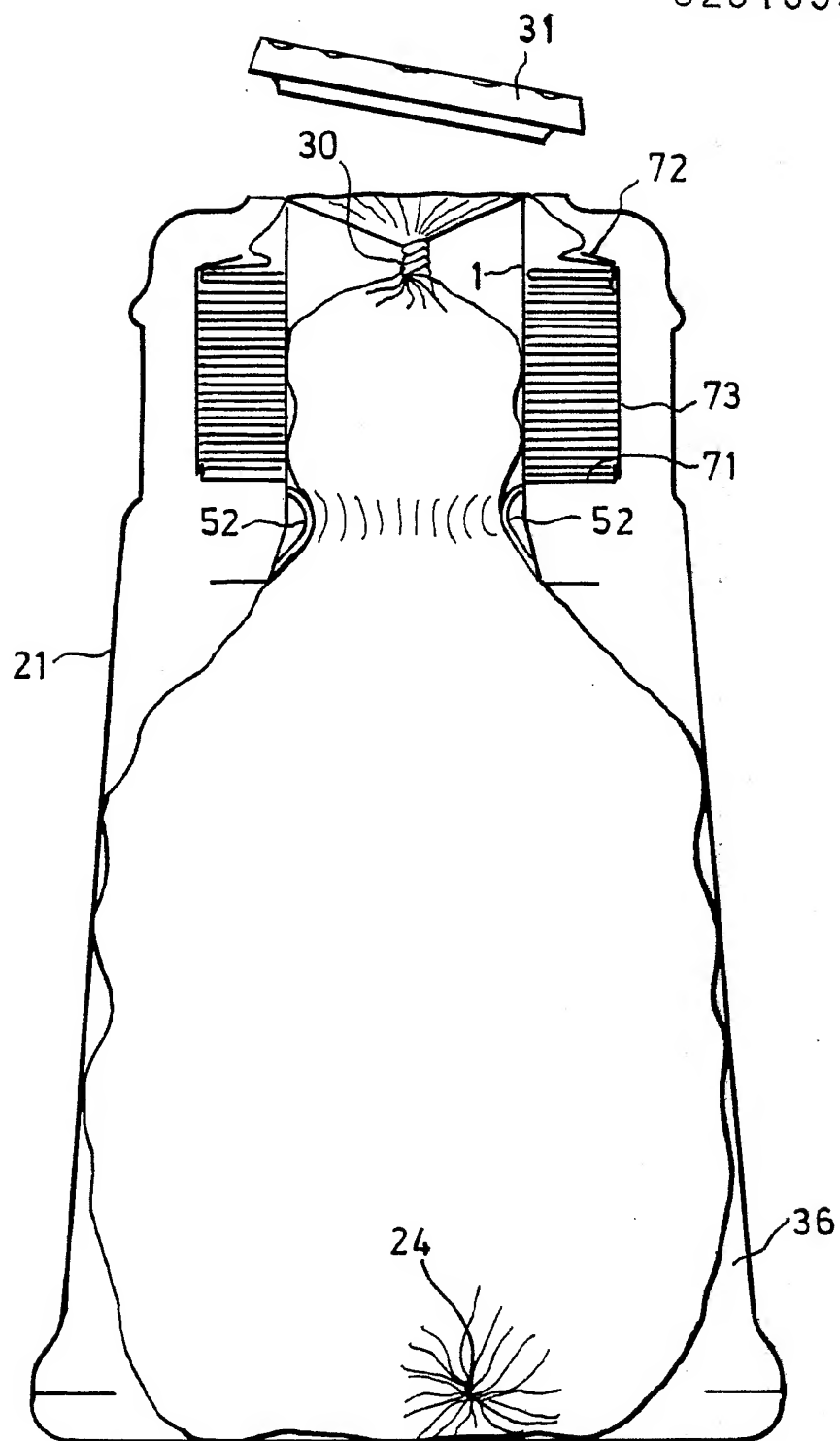


FIG.4.

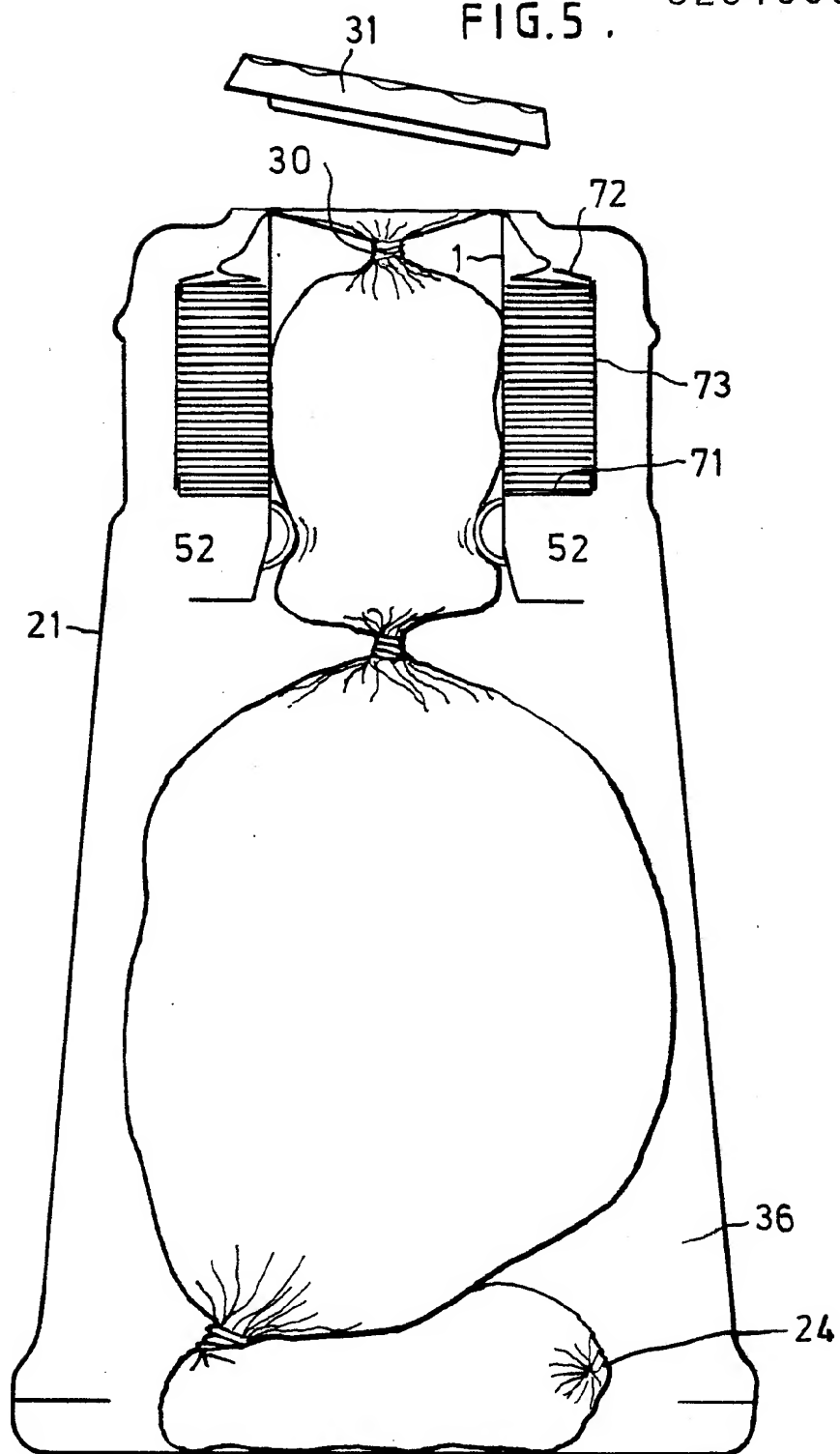
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FIG.5 .



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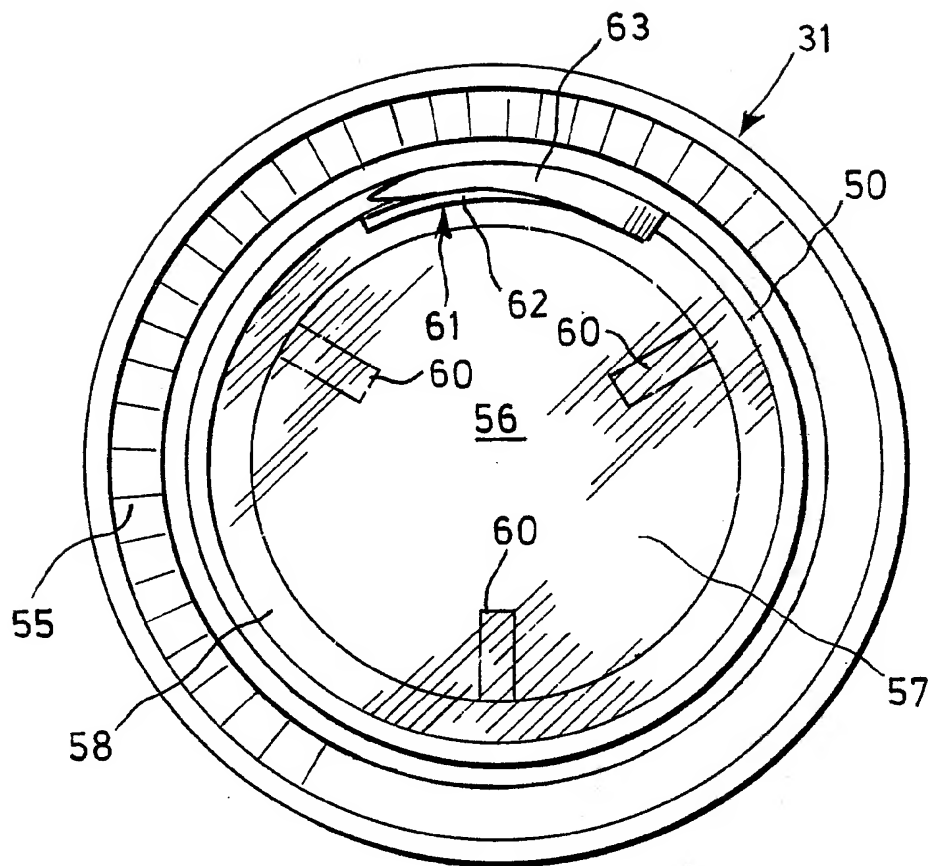


FIG. 6.